

REMARKS

I. Introduction

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of December 3, 2008 is respectfully requested.

By this amendment claims 14, 17, and 31 have been amended. Claims 14, 16-21, 28, and 30-35 are now pending in the application. No new matter has been added by these amendments.

II. 35 U.S.C. § 112

Claim 17 stands rejected under 35 U.S.C. § 112 for lacking antecedent basis. Claim 17 has been amended as suggested by the Examiner; withdrawal of this rejection is respectfully requested.

The Interview Summary of December 30, 2008 states: "The Examiner would like clarification in the next formal response on where in the original specification supports the limitation directed to machining the scroll wrap at one time." This limitation is supported by figure 5, which depicts the non-rotational tool (9) extending over the entire height of the side face of a scroll wrap, the profile of the tool having been transferred to the scroll wrap over its entire height. The limitation is further supported by figure 10, which depicts non-rotational tool (9) contacting the side face (1C) of the scroll wrap along its entire height. The specification at page 18, lines 4-5, describes figure 10: "inner face 1C is firstly machined by non-rotational tool 9 as shown by the solid line." (emphasis added.) The original specification thus clearly contains support for machining the scroll wrap as depicted in figure 10: with the blade contacting the entire height of the side face of the scroll wrap at the same time. The limitation is further

supported by the original specification at page 12, lines 4-9: "Thus, only moving non-rotational tool 9 in the longitudinal direction of wraps 1B and 2B to be Hale machined can provide the machine-finishing of the shape of the side face of the scroll to be Hale machined. This eliminates the time and adjustment required when a cutting machining process is divided to a plurality of steps." In other words, the scroll wrap is machined by moving the tool 9 only in the longitudinal direction, not by moving it vertically in distinct steps; the need for a plurality of steps is eliminated because the scroll wrap is hale-machined in a single step.

III. Prior Art Rejections

Currently, claims 14, 16-20, 28, and 30-34 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bishop (WO 89/08522) and claims 21 and 35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bishop (WO 89/08522) in view of Niwa et al. (US 4,615,091).

Claim 14 is patentable over Bishop and Niwa et al., whether taken alone or in combination, for the following reasons. Claim 14 requires a method for machining a scroll wrap, comprising, in part, forming a stationary scroll wrap and a slewing scroll wrap, wherein a side face of the stationary scroll wrap and a side face of the slewing scroll wrap each has a height extending from a respective one of said stationary end plate and said slewing end plate to a distal end; and non-rotating-tool machining said side face of one of said stationary scroll wrap and said slewing scroll wrap by moving along a longitudinal direction of said one of said stationary scroll wrap and said slewing scroll wrap a non-rotational blade such that said height is machined at one time, wherein a cutting edge of the non-rotational blade has a profile which is transferred to said height such that an optimum shape is provided when the one of said stationary scroll wrap and

said slewing scroll wrap is driven in a compressor generating heat and pressure, and wherein said cutting edge has a length greater than the height of said one of said stationary scroll wrap and said slewing scroll wrap.

Bishop discloses hale-machining a scroll wrap by making successively deeper passes with a non-rotating tool such that only a small fraction of the height of the scroll wrap is machined at one time. (See page 4, lines 26 - page 5, line 13; see also Figures 5-7.) More specifically, Bishop discloses that "100 cuts are required." (See page 7, lines 4.) Because Bishop does not disclose hale-machining an entire height of the side face at one time, Bishop cannot meet the requirements of claim 14.

In the last paragraph of page 10 of the Office Action of December 3, 2008, the Examiner asserts that claim 14 does not require that the height of the scroll wrap be machined in one pass. However, in the interview summary of December 30, 2008, the Examiner states that the present amendments to the claims do require that the entire height of the scroll wrap be machined at one time. In other words, the Examiner agrees that the amended claims require a limitation that is not disclosed by the prior art of record.

The interview summary goes further, stating "The draft amendments still do not overcome the obviousness of the Bishop reference." Based on the telephone interview, it is believed that the Examiner asserts that claim 14 is obvious under the same rationale asserted against claim 28 on page 6 of the Office Action: because Bishop discloses end milling an entire height of the side face of the scroll wrap at one time it would have been obvious to hale-machine an entire height of the side face of the scroll wrap at one time. Applicant respectfully disagrees for the following reasons.

First, Bishop expressly teaches away from hale-machining an entire height of the side

face, stating: "Because the tool is engaged with the wrap for a small depth compared to the depth engagement when the entire surface of the wrap (say 30mm deep) is machined at once as in the case of end-milling, the forces tending to deflect the wrap are greatly reduced." It would not have been obvious for a person of ordinary skill in the art to modify Bishop in a manner expressly discouraged by Bishop.

Second, Bishop teaches a non-rotating tool which has a cutting edge (13, 14) that extends for a small fraction of the length of the side face of the scroll wrap. (See Figures 5-7; see also page 9, lines 12-16 "cutting edges, or points 13 and 14 respectively.") Accordingly, Bishop not only fails to meet the requirement of claim 14 "said cutting edge has a length greater than the height," the non-rotating tool of Bishop *is incapable of machining the entire side face of the scroll wrap at one time*. Even if the Bishop reference were modified such that the entire height of the tool contacted the entire height of the side face of the scroll wrap, the entire height of the scroll wrap would not be machined at one time because the cutting edge of the tool would extend only over a small portion of the scroll wrap. The majority of the height of the side face of the scroll wrap would contact a non-cutting length of the tool, and would not be machined.

Third, Bishop teaches a non-rotating tool that is tilted at an angle relative to the side face of the scroll wrap. (See Figures 5-7; see also page 9, lines 12-16.) Even if the non-rotating tool of Bishop were capable of machining the entire side of the scroll wrap at one time, which it is not, the tilt angle of the tool would result in a very deep cut at the base of the scroll wrap. The Figure below shows Figure 7 of Bishop on the left, and a modified figure 7 on the right depicting the modification proposed by the Office Action in which the tool contacts the entire height of the side face of the scroll wrap at one time. The tilt angle is such that the scroll wrap may be machined cleanly off the end plate, or at least reduced in thickness to such an extent that it could

not withstand operation in a compressor. Thus it appears that the modification of Bishop proposed in the Office Action would destroy the scroll wrap.

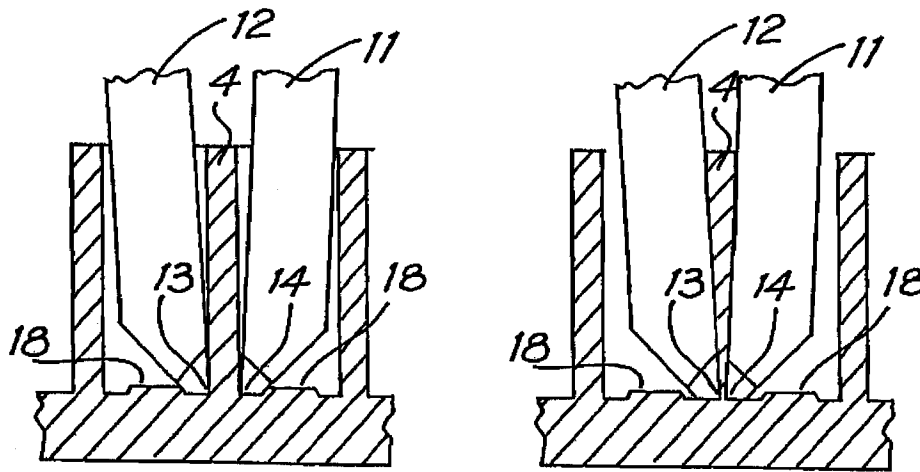


FIG. 7

Original Figure 7 of Bishop on left, Modified Figure 7 on right

The Office Action states, at page 10, "Figure 13 shows the non-rotational tool to be vertical in order to generate the cuts shown in Figure 14." To the contrary, Bishop states "In Figs. 9 to 14, the process of milling the side faces of the wraps are compared with the single point generation and face milling process according to the invention." (Emphasis added). In other words, Figures 12 to 14 depict the single point hale-machining discussed earlier in the specification in which the tool is tilted. The tilt angle of the tool can be seen in Figure 12; Figure 13 does not show the tilt angle of the tool because it is a view of a cross section perpendicular to the side face of the scroll wrap.

While Applicant disagrees with the prior art rejection as detailed above, the draft claims have been further amended substantially as suggested by the Examiner. In particular, claim 14 now requires that a cutting edge of the non-rotational blade have a profile which is transferred to

said height such that an optimum shape is provided when the one of said stationary scroll wrap and said slewing scroll wrap is driven in a compressor generating heat and pressure.

Bishop uses a single point non-rotational tool. (See Abstract.) This results in "a series of involute lines parallel to the end face 9," as seen in Figure 14 of Bishop. (Page 11, lines 30-31.) Unlike Bishop, the present invention transfers a profile of the non-rotational blade to the height of the side face of the scroll wrap, the height extending the end plate to a distal end of the scroll wrap, as depicted in Figure 5. Because Bishop does not disclose the blade having a profile which is transferred to said height, it cannot meet the requirements of claim 14. Further, Bishop fails to disclose an optimum shape being provided when the scroll wrap is driven in a compressor generating heat and pressure; as such, Bishop cannot meet the requirements of claim 14.

It is thus submitted that the invention of the present application, as defined in claim 14, is not anticipated nor rendered obvious by the prior art, and yields significant advantages over the prior art. Allowance is respectfully requested.

Claims 16-20, 28, and 30-34 depend, directly or indirectly, from claim 14 and are thus allowable for at least the reasons set forth above in support of claim 14.

In view of the foregoing amendments and remarks, inasmuch as all of the outstanding issues have been addressed, Applicants respectfully submit that the present application is in complete condition for issuance of a formal Notice of Allowance, and action to such effect is earnestly solicited.

Should any issues remain after consideration of the within response, however, the Examiner is invited to telephone the undersigned at his convenience.

If any fee beyond that submitted herewith, or extension of time is required to obtain entry of this Amendment, the undersigned hereby petitions the Commissioner to grant any necessary time extension and authorizes charging Deposit Account 23-0975 for any such fee not submitted herewith.

Respectfully submitted,

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